Department of
Environmental Protection
Bureau of Land & Water Quality July, 2002

O&M Newsletter

A monthly newsletter for wastewater discharge licensees, treatment facility operators and associated persons

Energy Conservation in Wastewater Treatment Facilities

This month's installment in the series of articles on Energy Conservation concerns Lighting. Lighting is often overlooked for energy saving opportunities at treatment facilities because it is overshadowed by the energy use of motor and pumps. At other types of facilities (schools, police stations, office building) lighting is a major energy consumer and is one of the first areas evaluated to improve efficiency and reduce costs. For example, the increased cooling demand generated by inefficient lighting systems can add 10% to cooling energy costs. Many businesses are lowering their lighting and cooling bills by installing energy efficient equipment. Likewise, municipal treatment facilities should also take full advantage of advances in lighting technology to reduce both the energy costs and the higher maintenance of older lighting systems.

Lighting technology and design have had many new developments in recent years. Technology improvements have increased lamp efficiency, improved color rendering and extended lamp life. New electronic ballasts enable fluorescent lamps to operate flicker-free, last longer, start faster and operate cooler. In addition, some ballasts provide smooth and silent dimming. Improvements in lighting fixtures offer better reflection of light and can reduce the number of bulbs needed. There have also been many developments in electronic controls for lighting, either daylight-linked or occupancy-linked. The payback for the costs of a lighting upgrade is typically between 1 and 3 years. Here is a simple example.

Existing Lighting system:

4- 40 watt T 12 fluorescent lamps (1.5 inch diameter by 4 feet)

- 2- 16 watt magnetic ballast
- Time used: 3000 hours per year
- Annual Cost: (192 watts x 3000 hrs) x 1 kW/1000watts x $0.10/ kW
- Annual Cost = $ 57.60

Replacement Lighting system:

- 2- 32 watt T 8 fluorescent lamps (1 inch diameter by 4 feet)
- 2 watt electronic ballast
- 1 - new Reflector Fixture
- Annual Electric Cost = $ 19.80
  Capital Cost for New Equipment = $65.00

$$Payback = \frac{Capital\ \ Cost}{Annual\ \ Savings} = \frac{\$65.00}{\$57.60 - \$19.80} = 1.7\ Years$$

The above example shows the benefits of changing a lighting fixture which is working. For fixtures which are in disrepair (blown, darkened, or discolored bulbs, or defective ballasts), replacing them with an energy efficient system is the only practical way to go. The above example is also only for one lighting fixture. Even small facilities will have many of these fixtures throughout a building. In this example, after 1.7 years the facility starts saving $ 37 per fixture per year.

Exit lights can also waste energy. Typical older exit lights have two 15 or 20 watt incandescent lamps. The new exit lights have either one 7 watt fluorescent lamp or two ½watt Light Emitting Diodes (LED). Exit lights are on all the time (8760 hours per year). Two 15 watt lamps at $0.10 per kilowatt-hour will use more than $25 per year in power and typical incandescent exit lamp bulbs typically last only about 4000 hours and can cost several dollars apiece. An LED retrofit kit only costs about $25. Converting older style exit lights to LEDs will pay for themselves in less than a year, and thereafter cost almost nothing to operate. Also, LEDs can last up to twenty-five years.

Becoming aware of today's efficient lamps, ballasts, reflective fixtures, and control options available is the first step toward reducing your lighting costs.

NEWEA/NEIWPCC/USEPA Security and Emergency Preparedness Workshops for Wastewater Facilities

The New England Water Environment Association (NEWEA) and the New England Interstate Water Pollution Control Commission (NEIWPCC), in conjunction with the U.S. Environmental Protection Agency (EPA) - New England, are pleased to announce eight one-day security training workshops in the New England area for POTWs. The workshops will focus on emergency preparedness and security in the wastewater industry and are geared toward small and large systems alike. The workshops will feature regional experts who will advise on the importance of protecting a community's wastewater treatment facility. Assessing the vulnerability of a facility and collection system is the first step POTWs can take to protect their municipality's investment. The importance of developing an emergency response and communication plan will also be reviewed.

These workshops are being offered in cooperation with the following State Agencies: Connecticut Dept. of Environmental Protection, Maine Dept. of Environmental Protection Massachusetts Dept. of Environmental Protection, New Hampshire Dept. of Environmental Services, Rhode Island Dept. of Environmental Management, and Vermont Dept. of Environmental Conservation

WORKSHOP INFORMATION - Eight Sessions / 8:00 AM - 3:30 PM

Tuesday, June 25, 2002 - Warwick, RI

Wednesday, July 17, 2002 - Chelmsford, MA

Tuesday, July 30, 2002 - Concord, NH

Tuesday, August 13, 2002 - Portland, ME

Tuesday, August 27, 2002 - Waterbury, VT

Tuesday, September 17, 2002 - Hartford, CT

Wednesday, September 25, 2002 - Brewer, ME

Tuesday, October 8, 2002 - Springfield, MA

(Dates and locations subject to change)

Emergency preparedness is a necessity for all our Regional POTWs. To address the need for emergency response planning and general security awareness, EPA, in cooperation with NEWEA and NEIWPCC, has planned eight workshops across New England to specifically meet the needs of small and large treatment plants alike.

- How safe is your wastewater facility and collection system?
- How secure is your chemical storage?
- How prepared is your community in the event of an emergency, act of nature, or terrorism?
- Does your plant have an Emergency Response Plan?
- How can you better assess your system's vulnerability?
- What steps can be taken to increase system security and level of preparedness?
- How can you work with your community to make the necessary improvements to your plant?

The security of wastewater utilities does warrant attention. Natural disasters, potential chemical hazards for plant security, and/or malicious introduction of flammable or explosive materials into wastewater collection systems could cause significant damage to the wastewater infrastructure and surrounding environment. Impairment of wastewater treatment could introduce high levels of contaminants that adversely affects overall water quality and downstream drinking supplies. Are you aware of the economic and environmental impacts of such an event? Do you know what resources are available to your community?

Who should attend?

Representatives of Small, Medium, and Large Communities
Municipal Officials Town Managers, Plant Superintendents
Treatment Plant Operators Consulting Engineers Department of Public Works
Emergency Responders

AGENDA

8:00AM - 8:30AM **REGISTRATION**

8:30AM - 8:45AM **Introduction - Opening Remarks -** US EPA New England

8:45AM - 9:45AM **General Security Overview for POTWs -** John T. Doherty, P.E. - CDM, Cambridge, MA - Fundamental principles of assessing a municipality's vulnerability and identifying steps to help prevent potential threats.

9:45AM - 10:00AM Break

10:00 AM - 10:45 AM **Emergency Response and Planning for Wastewater Facilities -** Justin Pimpare and Len Wallace, U.S. EPA

- Applicable requirements
- Essential components of emergency operating/response plans
- Available guidance to develop and update plan

10:45AM - 11:45AM **Panel Discussion -** Panel to include, but not limited to: representative of a local POTW, municipal official, media relations professional, emergency response personnel, collection systems personnel, state environmental agency representative, local emergency planning committee representative, state Emergency Management Agency (EMA) representative*****

11:45AM - 12:00 Noon **Questions & Answers** with AM speakers

12:00 Noon - 1:00 PM **Lunch -** Provided

1:00 PM - 1:45PM **Identifying and Assessing Vulnerability -** Charles Conway, NEIWPCC

1:45PM - 2:30PM **Vulnerability Assessment/Case Study-** A case study and/or examples of POTW vulnerability risks will be presented.

2:30PM - 2:45PM **Resources Available** - EPA New England and State Environmental Agency to provide update on available resources (tools for POTW operators and update on potential funding sources)

2:45PM - 3:15PM **Questions & Answers -** with PM speakers

3:15PM - 3:30PM **Next Steps - NEIWPCC, NEWEA, EPA New England**

3:30PM **Adjourn**

For more information, Contact: NEWEA at (781) 939-0908 or email: mail@newea.orgNEIWPCC at (978) 323-7929 or email: training@neiwpcc.org

Spring 2002 Exam

Results from the Spring exam have been distributed to those who took the test. The statistics for the Spring Exam are as follows:

Grade	Passed	Failed	% Passing
1	12	4	75%
2	12	5	71%
3	4	7	36%
4	2	10	17%
5	2	12	14%

Fall 2002 Exam

The Fall, 2002 wastewater operator certification exam will be given at the usual locations on November 13, 2002. Applications must be postmarked by September 28, 2002 or delivered to our office by September 30, 2002 to enroll for the exam.

UPCOMING TRAINING COURSES

August 13, 2002 in Portland, ME – Security and Emergency Preparedness Workshop for Wastewater Facilities – Sponsored by EPA/NEIWPCC/NEWEA, (978) 322-7929 – Approved for 6 hours.

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September 25, 2002 in Portland, ME – Security and Emergency Preparedness Workshop for Wastewater Facilities – Sponsored by EPA/NEIWPCC/NEWEA, (978) 322-7929 – Approved for 6 hours.

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October 16&17, 2002 in Presque Isle, ME – North Country Convention – Sponsored by JETCC, (207) 253-8020 – Approved for up to 12 hours.

For Practice

1. A circular clarifiers treats a flow of 800,000 gpd with an influent suspended solids of 2,250 mg/L. The diameter is 40 feet and the depth is 12 feet. What is the solids loading?
   a. 8.2 lb/day/sq. ft.
   b. 10.7 lb/day/sq. ft.
   c. 12.0 lb/day/sq. ft.
   a. 13.6 lb/day/sq. ft.

2. A large number of filamentous bacteria in an activated sludge system may:
   a. Cause foaming in the aeration basins or clarifiers.
   b. Cause poor settling and loss of solids to the receiving waters.
   c. Result from a toxic shock to the system
   d. All of the above

3. The age of the sludge in an activated sludge facility affects the dewaterability as follows:
   a. Older sludge is harder to dewater.
   b. Younger sludge is easier to dewater.
   c. Younger sludge is harder to dewater.
   d. Sludge age has no effect on dewaterability.

4. One horsepower is equivalent to
   a. 378.2 joules
   b. 0.75 amps at a voltage of 220
   c. 746 watts
   d. 1,000 megahertz

The Importance of Self-Reporting

Self-reporting is a cornerstone of Maine's efforts to achieve and maintain clean water. Accurate self-reporting and monitoring is not only essential, it's the law. Maine waste discharge licenses require sampling, preservation, handling and analytical methods to conform to Standard Methods for the Examination of Water and Wastewaters or methods referenced in 40 CFR Part 136. Variation from this requirement may be allowable only if prior written approval is granted by the Department of Environmental Protection.

It is the DEP's responsibility to monitor compliance with waste discharge licenses. In most instances, violations are dealt with informally through verbal or written communications. A small percentage of those in violation warrant formal enforcement action. Below are three brief case studies of facilities that have had compliance problems:

Case #1

This facility serves a small community of several hundred residents. As the result of a DEP file audit which identified multiple and repeated violations, an investigation was commenced. DEP staff learned that the facility discharge pipe which runs through a popular community swimming area, was broken and discharging treated wastewater in the swimming area. Furthermore, the facility had reported many fecal coliform violations during previous summers and on the day that DEP inspected the facility in June 2001, the chlorinator was malfunctioning.

Waste discharge licenses require that samples and measurements that are taken be representative of the volume and nature of the discharge. In the summer of 2001, the operator sampled for fecal coliform in the early mornings when bacteria kill could be expected to be at its best. He was subsequently instructed by DEP to sample later in the day when the sample would be more representative and would better reflect the actual impacts during times when flows and swimming activity would be more typical.

Case #2

This facility serves a small, rural community. During a DEP file audit it was found that the facility operator had reported consecutive zeros for many years for fecal coliform, total residual chlorine, and settleable solids. This prompted an investigation by DEP enforcement. During the first site visit to the facility, it was determined that the operator was performing settleable solids tests incorrectly. A sample of effluent revealed a fecal coliform count of 42,000 col/100 ml. The operator later told DEP that, unbeknownst to him, the sodium hypochlorite barrel had been empty on that day. During a second site visit, the DEP documented a fecal coliform count of greater than 850,000 col/100 ml which was later explained by the operator to have been caused by a leaking suction tube in the sodium hypochlorite barrel. DEP also determined that many of the zero fecal coliform counts could be explained by the fact that the operator had been conducting invalid fecal coliform tests by using m-endo broth rather than m-fc broth.

Case #3

This facility serves a moderately sized community. The facility operators have reported very few violations over the years, but recent site visits by the DEP have revealed a very different picture. Problems have included no back-up power and inoperable pumps at pump stations, unreported pump station overflows,

improper composite effluent sampling, failure to follow proper procedure for BOD and fecal coliform analyses, and improper storage of chemical drums. In addition, the facility is being improperly operated as evidenced by the excess of solids in the secondary clarifiers. During each of two recent DEP site visits, after rain events, solids were found to be overflowing the secondary clarifiers. During the first of the two visits (this one announced), DEP and the operator split a composite sample for BOD on a day that it rained. The 24 hour composite BOD as determined by the facility lab was 31 mg/l and the unofficial BOD as determined by the DHS Health & Environmental Testing Laboratory was 59 mg/l. *Both results were much higher than any the facility had reported in years.* When asked why he thought the BOD results had been so high on this date, the operator said the rain was the cause. During a second visit (this one unannounced) after a rain event and on a weekday the facility normally collects its composite BOD samples, we found the clarifiers overflowing solids and the composite sampler not turned on. The facility is required to do 24 hour composite BOD monitoring twice/week.

John Glowa

Answers to *For Practice:*

1. c The Solids loading to the clarifier is calculated by Flow × Concentration × 8.34 . 0.8 MGD × 2250 mg/L × 8.38 = 15,012 lb/day. The area of the clarifier is calculated by Diameter^2 × 0/785. 40 × 40 × 0.785 = 1,256 sq. ft. The clarifier solids loading is calculated by dividing the solids loading by the surface area. 15,012 lb/day ÷ 1,256 sq. ft = 12.0 lb/day/sq. ft.
2. d Filamentous bacteria can cause foaming (*Nocardia*) and poor settling (*S. Natans*) and can result from a toxic shock to the system.
3. c As a rule of thumb, young sludge forms looser flocs which hold more bound water and are, therefore, harder to dewater.
4. c One horsepower is equal to 746 watts or 0.746 kilowatts.